FLORIDA POLYTECHNIC UNIVERSITY

Course Information

- **Course Number and Title**: MAS 3105.01 Linear Algebra
- **Credit Hours:** 3 hours
- **Academic Term:** Fall 2024

Instructor Information

- **Instructor:** Dr. Joshua Drouin
- **Office Location:** IST-2015
- **Office Hours**: MWF 11:00-12:00 pm, or by appointment.
- **Email address**: JDrouin@floridapoly.edu

Course Delivery and Course Description

- **Delivery Mode**: Face-to-face; MWF 10:00 – 10:50, IST-1014
- **Course Website**: https://floridapolytechnic.instructure.com/
- **Official Catalog Course Description**: This course stresses the theoretical aspects of the following topics: vector spaces, linear transformations, linear equations and matrices, determinants, inner products, eigenvalues, projections, and least squares
    - **Course Pre and/or Co-Requisites**: MAC 2313 – Analytic Geometry and Calculus 3 or MAP 2302 –Differential Equations with a minimum grade of C (2.0).
    - **Communication/Computation Skills Requirement (6A-10.030)**: No
- **Required Texts and Materials:**
    - Textbook: An Introduction to Linear Algebra 5th edition
      Author: Gilbert Strang
      Wellesley-Cambridge Press, 2016
      ISBN 978-0-9802327-7-6
    - We will often need technology that can adequately run MATLAB

Course Objectives and Outcomes

Course Objectives:

- Students will gain a practical and theoretical understanding of fundamental principles of linear algebra. Emphasis will be given to learning critical concepts to include independent and dependent vectors, bases, matrices, matrix operations, determinants, matrix factorizations, special matrices, orthogonality, Eigenvalues, Eigenvectors, linear transformations, rank, null space, and a complete understanding of rectangular linear systems of equations.

Course Learning Outcomes:

1. Conceptual Understanding: Students will demonstrate a solid understanding of key concepts in linear algebra, including vectors, matrices, systems of linear equations, eigenvalues, and eigenvectors.
2. Matrix Operations: Students will be proficient in performing fundamental matrix operations, such as addition, subtraction, scalar multiplication, matrix multiplication, and finding the

inverse of a matrix.

3. Solving Systems of Equations: Students will be able to solve systems of linear equations using methods such as Gaussian elimination, matrix equations, and inverse matrices.
4. Matrix Factorizations: Students will understand the significance of matrix factorizations, such as LU decomposition, QR decomposition, and eigenvalue decompositions, in revealing the structural properties of a matrix.
5. Vector Spaces and Linear Transformations: Students will comprehend the concept of vector spaces, identify bases and linear independence, and analyze linear transformations, including composition and properties such as kernel and image.
6. Application and Problem-Solving: Students will apply linear algebra concepts to real-world problems, such as linear programming, least squares approximation, cryptography, and network analysis, demonstrating critical thinking and problem-solving skills, including the utilization of matrix factorizations for understanding matrix structures.

Additionally, students will:

1. Use computational techniques and algebraic skills essential for the study of systems of linear equations, matrix algebra, vector spaces, eigenvalues and eigenvectors, orthogonality, and diagonalization. (Computational and Algebraic Skills).
2. Use visualization, spatial reasoning, as well as geometric properties and strategies to model, solve problems, and view solutions, especially in 3 and 3 dimensions, as well as conceptually extend these results to higher dimensions. (Geometric Skills).
3. Critically analyze and construct mathematical arguments that relate to the study of introductory linear algebra. (Proof and Reasoning).
4. Calculate the eigenvalues and construct a basis for the eigenspaces of a matrix.
5. Communicate and understand mathematical statements, ideas, and results, both verbally and in writing, with the correct use of mathematical definitions, terminology, and symbols (Communication Skills).
6. Use technology, where appropriate, to enhance and facilitate mathematical understanding, as well as an aid in solving problems and presenting solutions (Technological Skills).
7. Work collaboratively with peers and instructors to acquire mathematical understanding and to formulate and solve problems and present solutions (Collaborative Skills).

Course Policies

Grading Scale

Grade	A	B+	B	B-	C+	C	D	F
Percentage	90%	87%	83%	80%	77%	70%	60%	< 60%
GPA	4.0	3.33	3.0	2.67	2.33	2.0	1.0	0.0

Assignment/Evaluation Methods

Homework	13%
Projects	12%
Quizzes	5%*
Attendance/Participation	0%†
Exams (3)	45%
Final Exam	25% **
Total	100%

*The lowest quiz grade will be dropped. Makeup quizzes will not be given.

**The final exam grade may replace the lowest exam grade (up to 80%) if it benefits the overall grade in the course. Note: All the 3 midterms are required. The final will NOT replace a 0 from a missed exam.

Homework: Homework will be assigned on Canvas on a regular basis and will cover important topics to help you to better learn the course material and to prepare for the exams. Dates and topics for these assignments will be announced via Canvas.

We will only have handwritten homework and it should be submitted digitally as a single file through Canvas. You can do so by scanning your work and submitting a PDF.

Homework will be graded on the basis of presentation (presenting professional, readable work), completeness (attempting a full solution for all assigned problems), and correctness (a subset of problems in each assignment will be fully graded for correctness). In order to receive full credit for a solution you must clearly communicate and annotate all steps thoroughly enough for a reader to easily see what you are doing and why.

It is vitally important that you make a solid effort to consistently complete all parts of the homework assignments. *Students that consistently skip homework or consistently perform poorly on homework assignments do not do well in this class*. Keep in mind that homework is not an exam, and that you are encouraged to discuss assignments with other students (as long as you submit your own work) and to ask your instructor for help as often as you like.

Homework submitted up to 24 hours after the posted due date will be accepted with a 20% penalty. No submissions will be accepted more than 24 hours late. Unexcused late work will not be accepted for any reason, including due to technical issues with Canvas, so be sure to submit early to avoid unexpected delays. If you are having issues submitting your assignment, be sure to email your work to your instructor *before* the cutoff to demonstrate that you've made a good-faith effort to meet the deadline. It is your responsibility to ensure that you submit the correct file. No corrections will be accepted after the cutoff for any reason. At the end of the semester your lowest two homework scores will be dropped.

Projects: Projects will be group assignments during which you will work through challenging problems that involve advanced applications of multiple concepts explored previously in the course. Projects will be significantly more involved than homework assignments and are meant to assess your ability to apply course material in solving new types of problems that go beyond what has been explicitly covered in class. Project topics and submission expectations will be discussed in class and posted on Canvas.

Quizzes: Quizzes will be given in-class. Quizzes are meant to act as quick checks of the important concepts and skills to be featured on the next exam in order to help you to identify topics that you will need to work on more in preparation. Like exams, quizzes are a form of assessment, and you are expected to prepare for them ahead of time. At the end of the semester your lowest quiz score will be dropped.

Attendance: To succeed in this class it is essential that you attend class regularly, and as such attendance will be taken daily to determine your attendance grade. Coming to class to be counted and then leaving is not permitted. Falsifying attendance for yourself or for another student is an act of academic dishonesty and is considered a violation of the university's academic integrity policy.

Exams: There will be three common unit exams during the semester, held in the evening outside of class. Tentative exam dates are included in the schedule below. Exact dates, times, and room numbers will be released by the Registrar after the semester begins.

Final Exam: There will be a common, comprehensive exam at the end of the semester. The final exam schedule will be released by the Registrar during the semester. Your lowest exam score may be replaced by your final exam score if that would improve it, up to a maximum of 80%.

Attendance

- Attendance is expected.
    - † This is a major's course, and you are expected to be in class and participating. Unless you are sick or at a medical appointment, you should attend class. Please do not be late for class. Unexcused absences or excessive tardiness will adversely affect your grade.
    - Students in face-to-face courses are expected to attend all of their scheduled University classes and to satisfy all academic objectives as defined by the instructor. (University Policy, FPU-5.0010AP) (see also University Policy).
- Students Feeling Sick:
    - Students should not come to class if they are feeling ill, particularly if experiencing symptoms of COVID-19, or if you have been directed by a health professional to quarantine. Students who are experiencing an emergency situation that aligns with an academic exercise of consequence (e.g./a Common Exam) should work with CARE Services at care@floridapoly.edu

Participation

Students are expected to participate in the classroom experience. The use of earbuds/headphones during class is specifically not allowed and students who engage in this behavior may be asked to leave the class for the day (noting exceptions for authorized accommodations). Persistent problems with participation may result in a code of conduct referral.

Late Work/Make-up work

Make-up exams will be given only in extreme circumstances with a documented excuse. If you will miss an exam because you are participating in a college-sponsored activity, inform your instructor before the exam and provide them with documentation. Late homework will receive a 20% penalty if received up to one day late. Homework received more than one day after the due date will not receive credit.

Academic Support Resources

- **Library**: Students can access the Florida Polytechnic University Library through the University website and Canvas, on and off campus. Students may direct questions to library@floridapoly.edu.
- **Peer Learning Strategists (PLS)**: Are specially trained student leaders who help their peers strategize approaches to course content and work through solution methods. PLS work in collaboration with the courses they support so the content and methods are aligned with your instructors' expectations. Students can meet with a PLS in The Learning Center, which is located on the first floor of the Innovation, Science and Technology (IST) building in room 1019.
- **Academic Success Coaches**: All students at Florida Poly are assigned an Academic Success Coach. Your Academic Success Coach can assist you with academic success strategies. Please visit the Student Success Center on the second floor of the IST building to meet with an Academic Success Coach.
- **Writing Center:** Located on the second floor of the IST (2059/2061), the Writing Center helps students to develop their writing and presentation skills. Consultations are available in person and virtually. For more detail, visit **https://floridapoly.edu/writingcenter**.

Civility and Collegiality

Faculty and students come to the university for the same reason, which is to participate in a highly professional educational environment. To that end, both students and faculty are expected to treat each other with mutual regard and civility. In more general terms, collegiality means respecting the right of both faculty and students to participate fully and fairly in the educational enterprise.

University Policies

Reasonable Accommodations

The University is committed to ensuring equal access to all educational opportunities. The University, through the Office of Disability Services (ODS), facilitates reasonable accommodations for students with disabilities and documented eligibility. It is the student's responsibility to self-identify as a student with disabilities and register with ODS to request accommodations.
If you have already registered with ODS, please ensure that you have requested an accommodation letter for this course through the ODS student portal and communicate with your instructor about your approved accommodations as soon as possible. Arrangements for testing accommodations must be made in advance. Accommodations are not retroactive.
If you are not registered with ODS but believe you have a temporary health condition or permanent disability requiring an accommodation, please contact ODS as soon as possible.

The Office of Disability Services (ODS):
DisabilityServices@floridapoly.edu
(863) 874-8770
The Access Point
ODS website: www.floridapoly.edy/disability

Accommodations for Religious Observances, Practices and Beliefs

The University will reasonably accommodate the religious observances, practices, and beliefs of individuals in regard to admissions, class attendance, and the scheduling of examinations and work assignments. (See University Policy.)

Title IX

Florida Polytechnic University is committed to ensuring a safe, productive learning environment on our campus that prohibits sex discrimination and sexual misconduct, including sexual harassment, sexual assault, dating violence, domestic violence and stalking. Resources are available if you or someone you know needs assistance. You may speak to your professor, but your professors have an obligation to report the incident to the Title IX Coordinator. Please know, however, that your information will be kept private to the greatest extent possible. You will not be required to share your experience. If you want to speak to someone who is permitted to keep your disclosure confidential, please seek assistance from the Florida Polytechnic University Ombuds Office, BayCare's Student Assistance Program, 1-800-878-5470 and locally within the community at Peace River Center, 863-413-2707 (24-hour hotline) or 863-413-2708 to schedule an appointment. The Title IX Coordinator is available for any questions to discussion resources and options available.

Academic Integrity

The faculty and administration take academic integrity very seriously. Violations of academic integrity regulation include actions such as cheating, plagiarism, use of unauthorized resources (including but not limited to use of Artificial Intelligence tools), illegal use of intellectual property, and inappropriately aiding other students. Such actions undermine the central mission of the university and negatively impact the value of your Florida Poly degree. Suspected violations will be fully investigated, possibly resulting in an academic integrity hearing and sanctions against the accused student if found in violation. Sanctions range from receiving a zero on the exam or assignment, to expulsion from the university. Repeat offenders are subject to more severe sanctions and penalties.

Recording Lectures

Students may, without prior notice, record video or audio of a class lecture for a class in which the student is enrolled for their own personal educational use. Recordings may not be used as a substitute for class participation or class attendance. Recordings may not be published or shared in any way, either intentionally or accidentally, without the written consent of the faculty member. Failure to adhere to these requirements is a violation of state law (subject to civil penalty) and the student code of conduct (subject to disciplinary action).

Recording class activities other than class lectures, including but not limited to lab sessions, student presentations (whether individually or part of a group), class discussion (except when incidental to and incorporated within a class lecture), and invited guest speakers is ***prohibited****.*

Course Schedule (Subject to Change)

Important Dates: https://floridapoly.edu/academics/academic-calendar/index.php

(Subject to change)

Week	Monday	Wednesday	Friday
Week 1 Aug 21 – Aug 23		1.1	1.2, 1.3
Week 2 Aug 26 – Aug 30	2.1, 2.2	2.2, 2.3	2.3, 2.4
Week 3 Sep 2 – Sep 6	Labor Day	2.4, 2.5	2.5, 2.6
Week 4 Sep 9 – Sep 13	2.6	Review	Exam 1
Week 5 Sep 16 – Sep 20	3.1	3.2	3.3
Week 6 Sep 23 – Sep 27	3.4	3.4, 3.5	3.5
Week 7 Sep 30 – Oct 4	4.1	4.1	4.2
Week 8 Oct 7 – Oct 11	4.2	Review	Exam 2
Week 9 Oct 14 – Oct 18	4.3	4.3	4.4
Week 10 Oct 21 – Oct 25	4.4	5.1	5.2
Week 11 Oct 28 – Nov 1	5.2	6.1	6.1, 6.2
Week 12 Nov 4 – Nov 8	6.2	Review	Exam 3
Week 13 Nov 11 – Nov 15	Veteran's Day (No Classes)	6.4	6.4
Week 14 Nov 18 – Nov 22	6.5	8.1	8.1, 8.2
Week 15 Nov 25 – Nov 29	8.2	Thanksgiving (No Classes)	
Week 16 Dec 2 – Dec 6	Review	Review	Reading Day (No Classes)